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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,847

10/20/2005

Ikutomo Umeoka

2005\_1497A

6289

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11/26/2008

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EXAMINER

KASTURE, DNYANESH G

ART UNIT

PAPER NUMBER

3746

MAIL DATE

DELIVERY MODE

11/26/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/553,847	<b>Applicant(s)</b> UMEOKA ET AL.	
	<b>Examiner</b> DNYANESH KASTURE	<b>Art Unit</b> 3746	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 September 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10, 12 and 13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12 and 13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Specification***

1. The previously made objections to the specification are hereby withdrawn in view of amendments submitted by the applicant on September 24, 2008.

### ***Claim Objections***

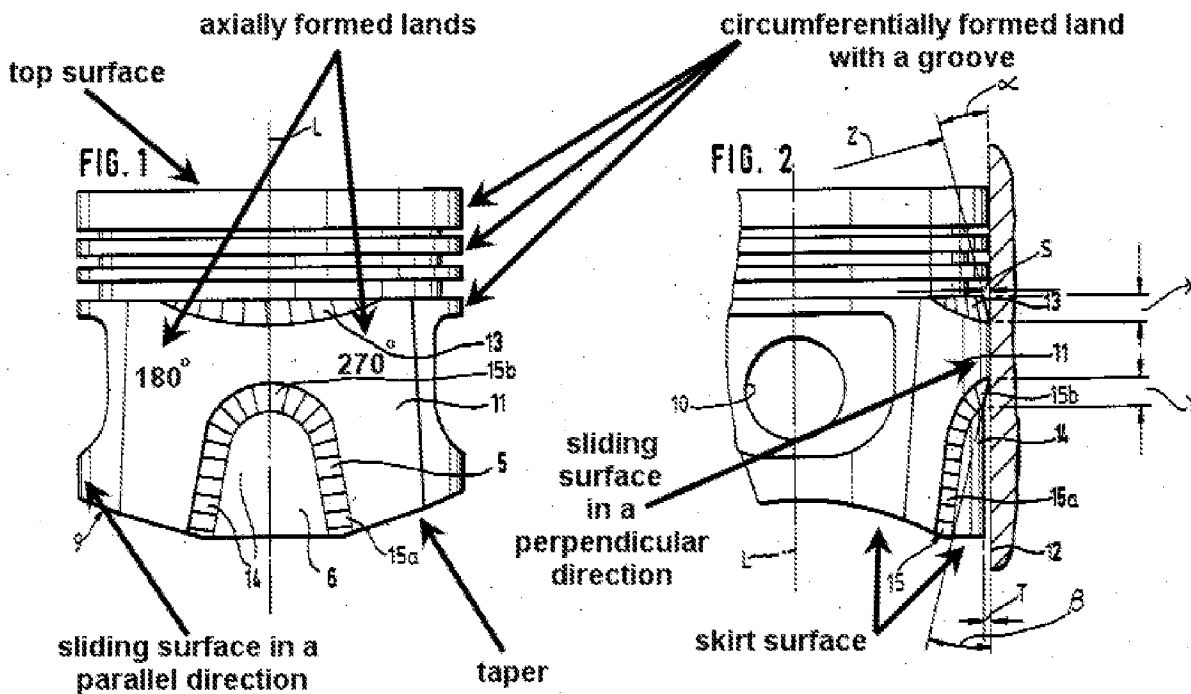
2. The previously made objections to claims 1, 5, 9 and 11 are hereby withdrawn in view of amendments submitted by the applicant on September 24, 2008.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 – 6, 9, 10 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (Japanese Patent Publication number JP 2004027969) and in view of Ellermann et al (US Patent 4,599,935 A).



5. In Re claim 1, Kojima discloses a hermetic compressor (abstract) comprising a housing (1) which contains oil and houses a compression mechanism (6) for compressing a refrigerant gas, the compression mechanism comprising:

- a crankshaft (10) disposed in a vertical direction and having a main shaft (11) and an eccentric shaft (12)
- a block (16) forming a cylinder (17) which inherently has an axis
- a piston (20) arranged to reciprocate in the cylinder (17) in a direction of the cylinder axis, the piston inherently having an outer circumferential surface and a top surface as depicted
- a piston pin (22, 122) disposed in the piston (20) such that a center axis of the piston pin is parallel to the eccentric shaft (12)
- a connecting rod (21) for connecting the eccentric shaft (12) to the piston pin

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- an oil supplying structure (14) for supplying oil to an outer circumferential surface of the piston (20)
- part of the skirt side of the piston (20) is protruded to the outside of cylinder (16, 17) in the vicinity of the bottom dead center position as depicted in Figure 5

6. However, Kojima does not disclose an undercut configured in a manner set forth in the claim.

7. Nevertheless, with reference to Figures 1 and 2 depicted above, Ellermann et al discloses a piston (abstract) with an under cut (14) formed in the outer circumferential surface (11) outside a sliding surface thereof (depicted) existing in a parallel direction and in a perpendicular direction of the piston pin as viewed in an axial direction of the piston as depicted (see relative orientation of the hole (10)), The under cut is separated from the top surface of the piston (separation depicted by the double sided arrow between "X" and "Y"), and communicates with a space inside the housing because it is situated at the bottom of the piston.

8. It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the piston of Ellermann et al instead of the piston in the compressor of Kojima as an alternate design choice for a piston that reduces the friction between the piston skirt and cylinder liner as stated by Ellermann et al in Column 1, Lines 63-64.

9. In Re claim 2, Ellermann et al depicts that the under cut occupies a substantially large area of the circumferential surface, however it does not specifically say that the

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undercut is no less than half the area. Nevertheless it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art - MPEP 2144.05 (II-B). Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations.

10. In Re claim 3, Ellermann et al depicts an angle  $\beta$  that is acute as depicted which is substantially maintained around the edges of the undercut ending in the skirt surface.

11. In Re claim 4, Ellermann et al depicts the undercut surface (6) is formed continuously to a skirt surface of the piston.

12. In Re claim 5, Ellermann et al depicts the piston having a circumferentially formed land over a predetermined axial width extending axially from the top surface towards the skirt surface, The groove in the circumferentially formed land is also depicted.

13. In Re claim 6, Ellermann et al depicts a taper in the boundary between the outer circumferential surface and a skirt surface of the piston.

14. In Re claim 9, Kojima discloses a hermetic compressor (abstract) comprising a housing (1) which contains oil and houses a compression mechanism (6) for compressing a refrigerant gas, the compression mechanism comprising:

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- a crankshaft (10) disposed in a vertical direction and having a main shaft (11) and an eccentric shaft (12)
- a block (16) forming a cylinder (17)
- a cylindrical piston (20) arranged to reciprocate in the cylinder (17) in a direction of a cylinder axis
- a piston pin (22, 122) disposed on the piston (20) in a way in which a center axis is in parallel to the eccentric shaft (12)
- a connecting rod (21) for connecting the eccentric shaft (12) to the piston pin, the piston pin and the connecting rod forming the connecting portion
- part of the skirt side of the piston (20) is protruded to the outside of cylinder (16, 17) in the vicinity of the bottom dead center position as depicted in Figure 5

15. However, Kojima does not disclose under cuts and the land surfaces formed as a result with configuration and form as set forth in the claim.

16. Nevertheless, with reference to Figures 1 and 2 depicted above, Ellermann et al discloses a cylindrical piston with a skirt surface at the side of the connecting portion (10), a top surface as depicted and:

- an outer circumferential surface (11) parallel to the cylinder
- the outer circumferential surface having an under cut (14) and lands (where there is no under cut), where:
- the undercut is recessed with reference to the outer circumferential surface and the lands are on the same surface as the outer circumferential surface, the lands comprising:

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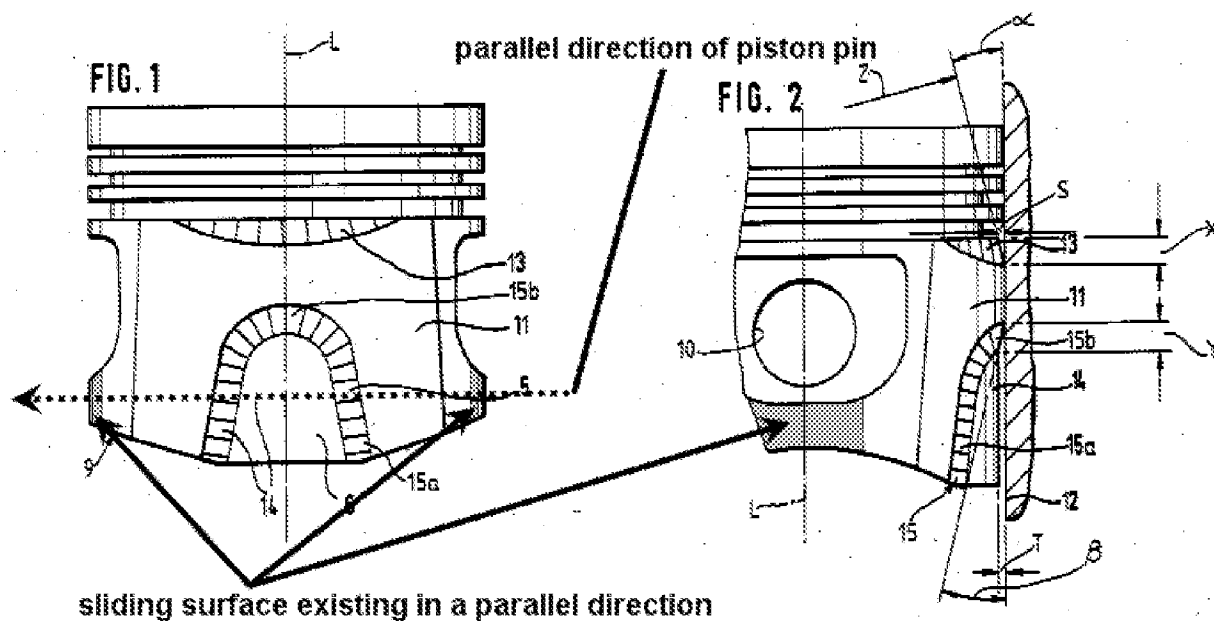
- a circumferentially formed land as depicted over a predetermined width extending from the top surface towards the skirt surface
- an axially formed land formed in a predetermined circumferential width on the outer circumferential surface at circumferential locations at 0 deg, 90 deg, 180 deg and 270 deg with respect to the cylinder axis as a center as depicted (note that only the 180 deg and 270 deg positions are shown, the 0 deg and 90 deg positions are symmetrically on the other side of the piston), the lands are continuously formed with no breaks (as depicted) from the circumferentially formed land to the skirt surface

17. It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the piston of Ellermann et al instead of the piston in the compressor of Kojima as an alternate design choice for a piston that reduces the friction between the piston skirt and cylinder liner as stated by Ellermann et al in Column 1, Lines 63-64.

18. In Re claim 10, Ellermann et al depicts the undercut surface (6) is formed continuously to a skirt surface.

19. In Re claim 12, the depiction below of Ellermann et al illustrates the two diametrically opposed surfaces, each of which extends axially because it has a width and a depth, and both intersect the dotted arrow that denotes the parallel direction of the piston pin.





It can similarly be illustrated that the perpendicular direction of the piston pin is intersected in the same way for the other two diametrically opposed sliding surfaces.

20. In Re claim 13, see response to arguments section, where the angle could be measured from a different location and still read on the claim, because there are several lines that can point in the parallel direction of the piston pin.

21. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (Japanese Patent Publication number JP 2004027969) in view of Ellermann et al (US Patent 4,599,935 A) and further in view of Helt (US Patent 6,282,910 B1).

22. In Re claim 7, Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations except for the motor element driven by an inverter at plural

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operating frequencies including an operation frequency that is at least a power supply frequency or less.

23. Nevertheless Helt discloses how power at a nominal frequency from a power supply is input to an inverter which converts that power to a reduced frequency at its output which is conveyed to a motor which runs at a reduced speed - Column 5, Lines 59-65: "Power at a nominal frequency from supply 27 is applied to inputs 63 and 64 of inverter 50. Inverter 50 then converts that power to create an output of a lower than nominal frequency at inverter outputs 65 and 66, which closed contacts 56 now conveys to motor input 62. The lower frequency causes blower motor 48 to run at a reduced blower speed ..".

24. It would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the inverter and reduced frequency motor operation methodology of Helt into the motor of Kojima modified by Ellermann et al as a suitable design choice for the motor apparatus and mode of operation for the purpose of providing lower flow rates when appropriate, as stated in by Helt in Column 5, line 65.

25. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (Japanese Patent Publication number JP 2004027969) in view of Ellermann et al (US Patent 4,599,935 A) and further in view of Numoto et al (US Patent 6,082,132 A).

26. In Re claim 8, Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations except for the usage of R 600 a refrigerant gas.

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27. However, Numoto et al discloses in Column 1 line 7 that R600a refrigerant is used in a refrigeration cycle.

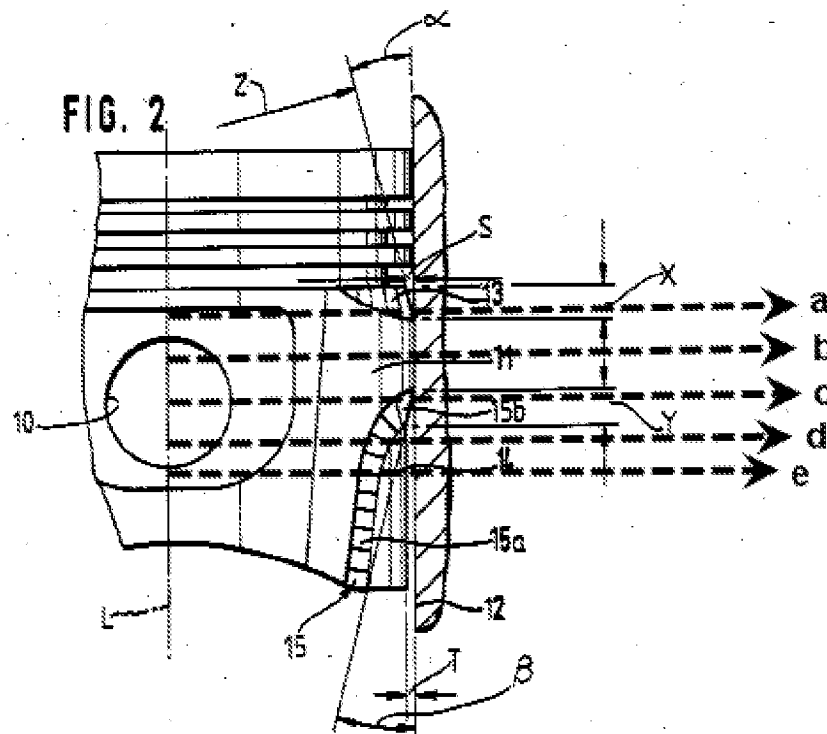
28. It would have been obvious to a person having ordinary skill in the art at the time of the invention to use R 600 a refrigerant of Numoto et al in the compressor of Kojima modified by Ellermann et al as a suitable design choice for a compressible medium that does not contribute to global warming and preserves the ozone layer as mentioned in Column 1, Lines15-25 of Numoto et al.

### ***Response to Arguments***

29. Applicant has argued that the undercut is formed WITHIN the sliding surface of Ellermann et al as opposed to OUTSIDE the sliding surface as claimed, existing in the perpendicular direction of the piston pin as viewed in the axial direction of the piston.

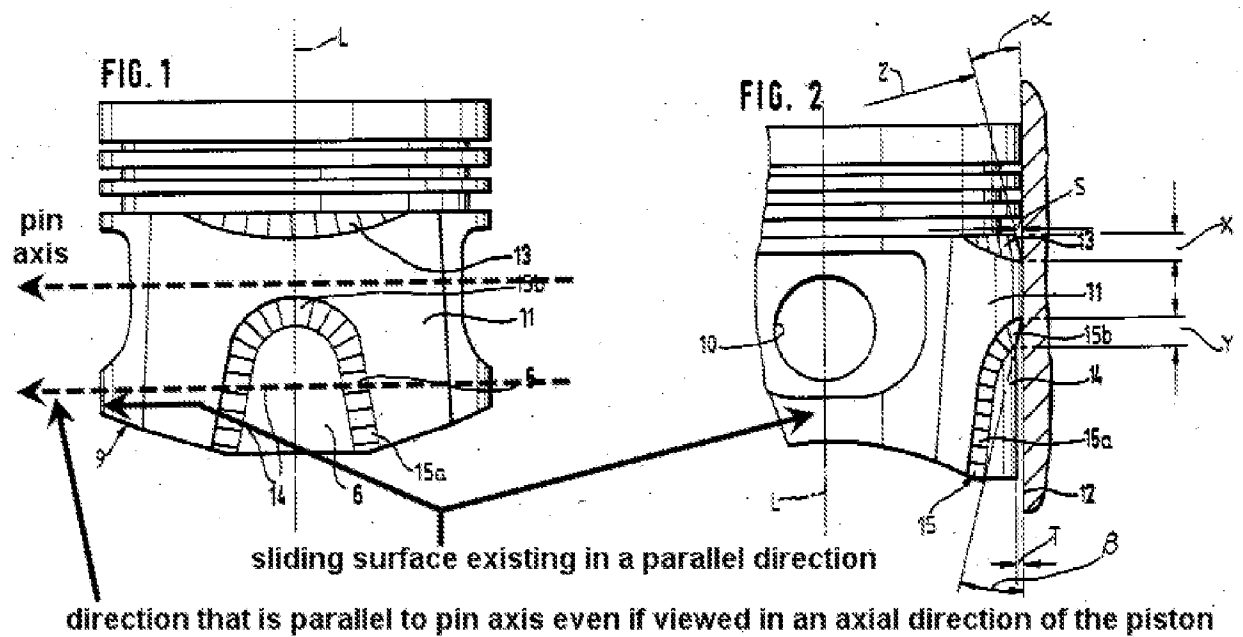
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30. Examiner's response: The claim phrase "as viewed in an axial direction of the piston" is being used as a frame of reference to describe the orientation of the parallel and perpendicular directions as related to the axis of the pin. However, this orientation also exists for a frame of reference at ANY point along the axis of the piston. Therefore a frame of reference at ANY point along the axis of the piston would read on this claim phrase. Any of the arrows annotated in Figure 2 below for example would read on a "perpendicular direction of the piston pin, as viewed in an axial direction of the piston".

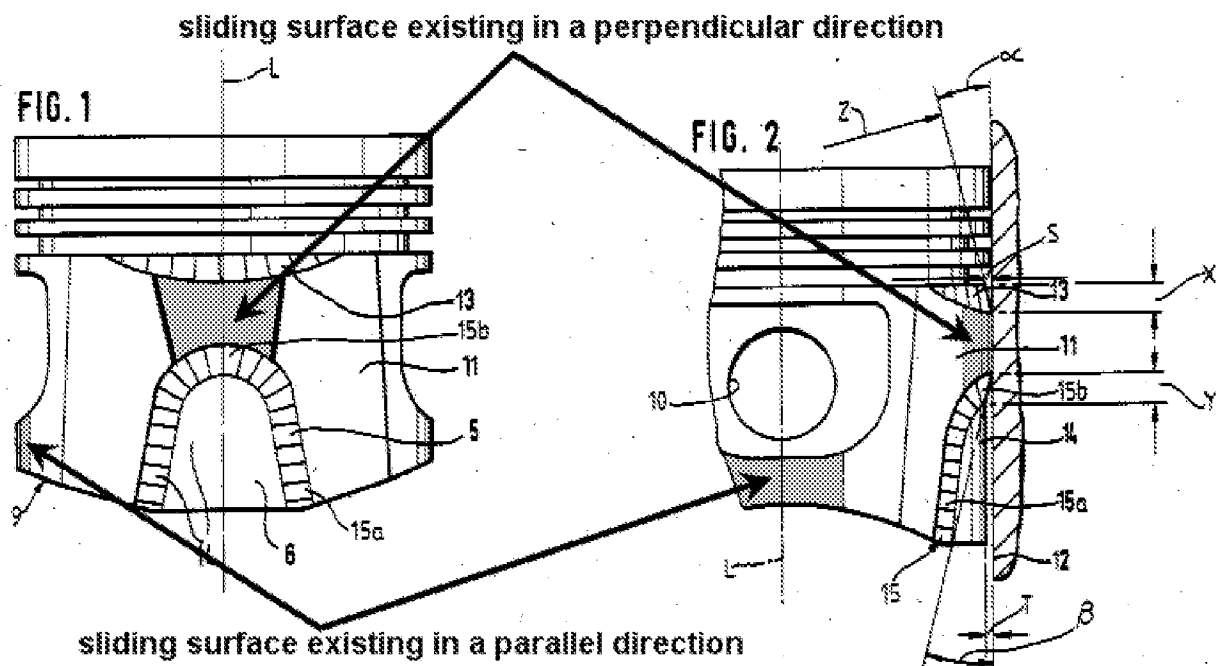


The arrow "b" above is in the direction of a sliding surface that is annotated in the figure below:





The figure below shows a painting of both sliding surfaces: the one existing in a parallel direction and the one existing in a perpendicular direction.

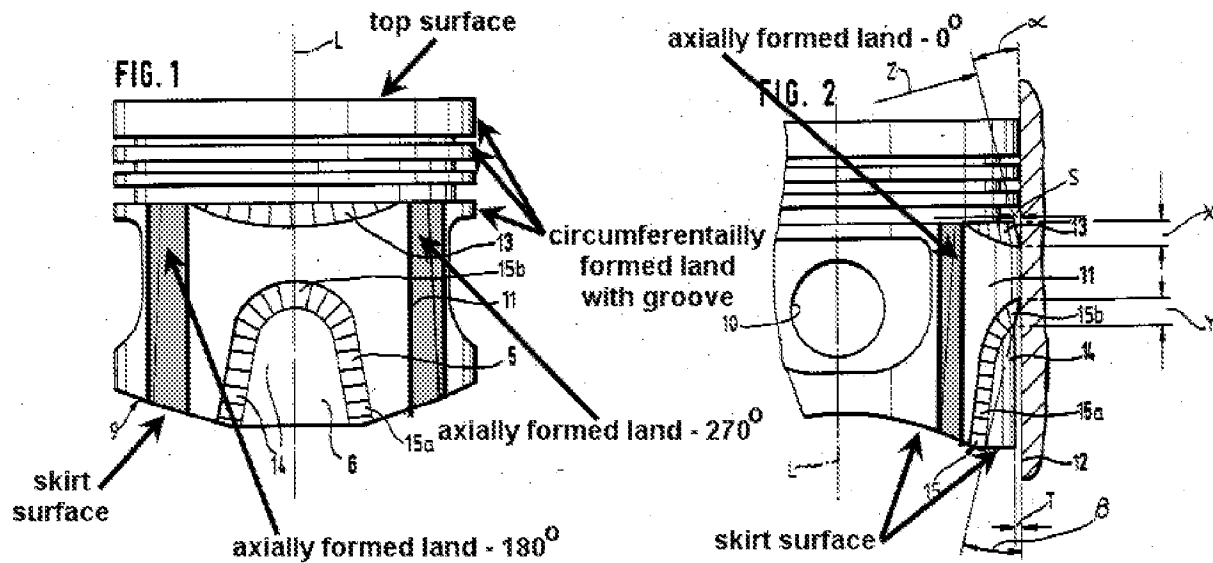


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As is clear from the figure above, the under cut (14) is NOT WITHIN either one of the two sliding surface regions, and is therefore clearly OUTSIDE each of the two sliding surface regions.

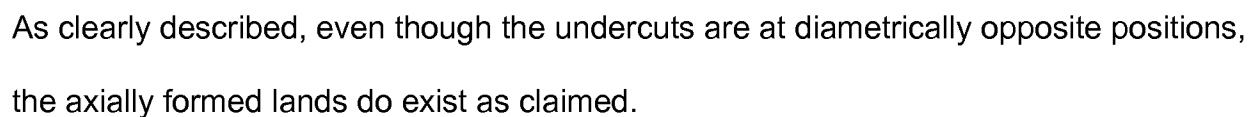
31. Applicant has argued that the undercuts (13, 14) of Ellermann et al are disposed at symmetrical locations and a location diametrically opposite thereto, and there is no disclosure or suggestion of providing both a circumferentially formed land and an axial land as claimed, and that there is no disclosure in Ellermann et al that would support the assertion that these lands are disposed at equal angular intervals.

32. Examiner's Response: With regards to non-disclosure of circumferentially / axially formed lands and disposition at angular interval of these lands, it does not matter that the specification is silent to or does not explain a feature in the drawings. The drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art – MPEP 2125. Regarding "axially formed lands at 0, 90, 180 and 270 degrees", all it takes to meet this claim limitation is if it can be shown that there are four lands where ONLY ONE POINT on each land is equiangularly spaced. With reference to the depiction below, the axially formed lands at 0, 180 and 270 degrees have been painted.



Clearly, the axial lands have a predetermined width and are continuously formed between the circumferentially formed land above them to the skirt surface below them. The figure below shows the angular orientation with a schematic top view of the piston that illustrates at least one point on these lands that is equiangularly disposed.

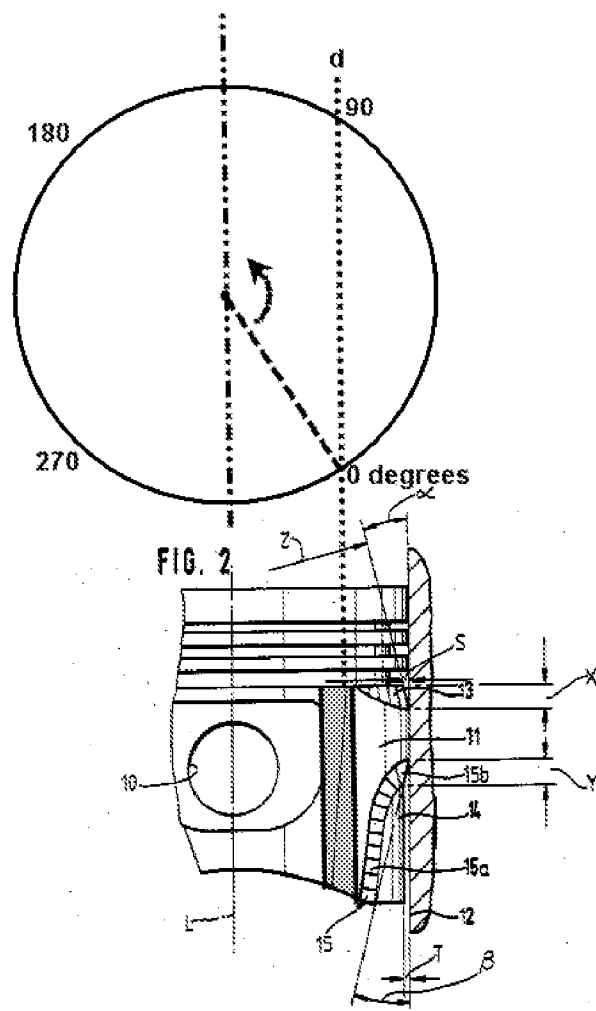
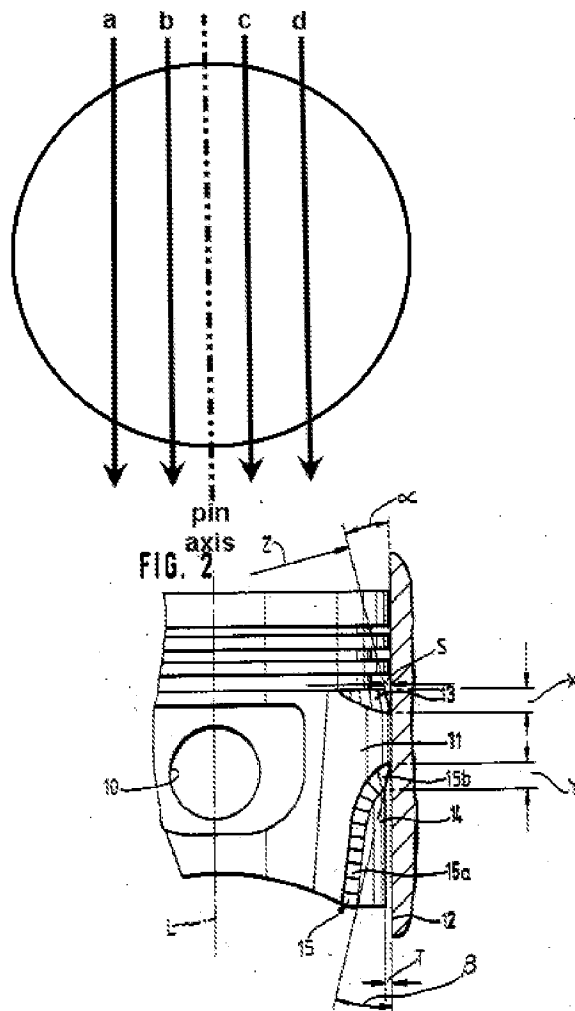




33. Applicant has argued that Ellermann et al does not disclose the limitations of dependant claim 13 which further specifies that the circumferential locations are measured circumferentially from an intersection of the outer circumferential surface and the parallel direction of the piston pin.

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34. Examiner's response: There are several lines that can point in a parallel direction of the piston pin as illustrated in the left half of the figure below.



Arrows "a", "b", "c" and "d" all point in the direction parallel to the piston pin. As depicted in the right half of figure above, the angle could be measured from the intersection of arrow "d" and the outer circumferential surface, and therefore Ellermann et al still reads on the claim.

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35. Applicant has argued (Page 13) that Ellermann et al discloses ONLY the presence of undercuts at the 0 degrees and 180 degrees locations, and is therefore in clear contrast to the arrangement of claim 13.

36. Examiner's response: The claim 13 does not require the UNDERCUTS to be positioned at 0, 90, 180 and 270 degrees. It only refers to the circumferential locations of the LANDS. As discussed above, even though the undercuts are formed diametrically opposite to each other, the four LANDS still exist as claimed.

37. All of applicant's arguments have been carefully considered but are not persuasive for the reasons discussed above. The examiner therefore respectfully disagrees with the applicant and maintains that this application is not in condition for allowance.

### ***Conclusion***

38. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DNYANESH KASTURE whose telephone number is (571)270-3928. The examiner can normally be reached on Mon-Fri, 9:00 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272 - 7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/  
Supervisory Patent Examiner, Art  
Unit 3746

DGK